AMENDMENTS TO THE CLAIMS

This listing of the claims will replace all prior versions, listings, of claims in the application:

Claims 1-18 (canceled)

Claim 19 (currently amended): A method for controlling a process comprising ~~the steps of~~:

a) converting at least one submodel of a nonlinear model having two or more submodels to a linear model, each of said two or more submodels having a predetermined one of two or more model predictive controllers associated therewith, said linear model for operating said associated one of said two or more controllers;

b) using said nonlinear model in a real time optimizer to compute targets for all of said two or more model predictive controllers, a predetermined subset of said computed targets associated with a respective one of said two or more controllers;

c) passing each of said predetermined subsets of said computed targets associated with a respective one of said two or more model predictive controllers to said associated one of said two or more controllers; and

d) passing said linear model to said associated one of said two or more controllers.

Claim 20 (currently amended): The method of Claim 19 wherein:

said converting ~~step~~ is replaced by the following ~~steps~~:

receiving plant measurement variables from a regulatory control system;

pretreating said plant measurement variables;

reconciling said pretreated plant measurement variables;

using said reconciled and pretreated plant measurement variables to update one or more variables of each submodel of a nonlinear model, said nonlinear

model having two or more of said submodels, each of said two or more submodels having a predetermined one of two or more model predictive controllers associated therewith; and

converting at least one updated submodel of said updated nonlinear model to a linear submodel when a change in said one or more of said updated submodel variables has exceeded a predetermined threshold, said linear submodel for operating said associated one of said two or more controllers; and

said ~~step of~~ passing a linear model to said associated one of said two or more controllers is replaced by the following ~~steps~~:

converting said at least one linearized submodel to a full order state space submodel;

creating from said full order state space submodel a state space submodel having fewer states than said full order state space submodel;

converting said fewer states state space submodel to a MPC format submodel; and

evaluating the performance of said MPC format submodel with the tuning for a presently existing submodel of said process in said associated one of said two or more model predictive controllers versus the performance of said presently existing submodel with said tuning and either:

passing said MPC format submodel with said presently existing submodel tuning to said associated one of said two or more model predictive controllers when said performance evaluation of said MPC format submodel exceeds a first predetermined limit; or

computing new tuning for said MPC format submodel when said performance evaluation of said MPC format submodel falls below said first predetermined limit and repeating said evaluations ~~step~~; or

returning said MPC format submodel to said ~~step of~~ creating a MPC format submodel having fewer states than said full order state space submodel to change the number of states in said MPC format submodel when said performance of said MPC format submodel falls below said first predetermined limit.

Claim 21 (currently amended): The method of Claim 19 wherein:

said converting ~~step~~ is replaced by the following ~~steps~~:

receiving plant measurement variables from a regulatory control system;

pretreating said plant measurement variables;

reconciling said pretreated plant measurement variables;

using said reconciled and pretreated plant measurement variables to update one or more variables of each submodel of a nonlinear model, said nonlinear model having two or more of said submodels, each of said two or more submodels having a predetermined one of two or more model predictive controllers associated therewith; and

converting at least one updated submodel of said updated nonlinear model to a linear submodel when a change in one or more model prediction errors in an associated one of one or more MPC format submodels currently operational in an associated one of said two or more model predictive controllers has exceeded a predetermined threshold, said linear submodel for operating said associated one of said two or more controllers; and

said ~~step of~~ passing a linear model to said associated one of said two or more controllers is replaced by the following ~~steps~~:

converting said at least one linearized submodel

to a full order state space submodel;

creating from said full order state space submodel a state space submodel having fewer states than said full order state space submodel;

converting said fewer states state space submodel to said MPC format submodel; and

evaluating the performance of said MPC format submodel with the tuning for a presently existing submodel of said process in said associated one of said two or more model predictive controllers versus the performance of said presently existing submodel with said tuning and either:

passing said MPC format submodel with said presently existing submodel tuning to said associated one of said two or more model predictive controllers when said performance evaluation of said MPC format submodel exceeds a first predetermined limit; or

computing new tuning for said MPC format submodel when said performance evaluation of said MPC format submodel falls below said first predetermined limit and repeating said evaluations ~~step~~; or

returning said MPC format submodel to said step of creating a MPC format submodel having fewer states than said full order state space submodel to change the number of states in said MPC format submodel when said performance of said MPC format submodel falls below said first predetermined limit.

Claim 22 (currently amended): The method of Claim 19 wherein:

said converting ~~step~~ is replaced by the following steps:

receiving plant measurement variables from a regulatory control system;

pretreating said plant measurement variables;

reconciling said pretreated plant measurement

variables;

using said reconciled and pretreated plant measurement variables to update one or more variables of each submodel of a nonlinear model, said nonlinear model having two or more of said submodels, each of said two or more submodels having a predetermined one of two or more model predictive controllers associated therewith; and

converting at least one updated submodel of said updated nonlinear model to a linear submodel when a change in said one or more of said updated submodel variables has exceeded a predetermined threshold, said linear submodel for operating said associated one of said two or more controllers; and

said ~~step of~~ passing a linear model to said associated one of said two or more controllers comprises ~~the steps of~~:

evaluating the performance of said MPC format submodel with the tuning for a presently existing submodel of said process in said associated one of said two or more model predictive controllers versus the performance of said presently existing submodel with said tuning and either:

passing said MPC format submodel with said presently existing submodel tuning to said associated one of said two or more model predictive controllers when said performance evaluation of said MPC format submodel exceeds a first predetermined limit; or

computing new tuning for said MPC format submodel when said performance evaluation of said MPC format submodel falls below said first predetermined limit and repeating said evaluating ~~step~~.

Claim 23 (currently amended): The method of Claim 19 wherein:

said converting ~~step~~ is replaced by the following

~~steps~~:

receiving plant measurement variables from a regulatory control system;

pretreating said plant measurement variables;

reconciling said pretreated plant measurement variables;

using said reconciled and pretreated plant measurement variables to update one or more variables of each submodel of a nonlinear model, said nonlinear model having two or more of said submodels, each of said two or more submodels having a predetermined one of two or more model predictive controllers associated therewith; and

converting at least one updated submodel of said updated nonlinear model to a linear submodel when a change in one or more model prediction errors in an associated one of one or more MPC format submodels currently operational in an associated one of said two or more model predictive controllers has exceeded a predetermined threshold, said linear submodel for operating said associated one of said two or more controllers; and

said ~~step of~~ passing a linear model to said associated one of said two or more controllers comprises ~~the steps of~~:

evaluating the performance of said MPC format submodel with the tuning for a presently existing submodel of said process in said associated one of said two or more model predictive controllers versus the performance of said presently existing submodel with said tuning and either:

passing said MPC format submodel with said presently existing submodel tuning to said associated one of said two or more model predictive controllers when said performance evaluation of said MPC format

submodel exceeds a first predetermined limit; or

computing new tuning for said MPC format submodel when said performance evaluation of said MPC format submodel falls below said first predetermined limit and repeating said evaluating ~~step~~.

Claims 24-32 (canceled)

Claim 33 (original): Apparatus for controlling a process having process measurement variables associated therewith, said apparatus comprising:

a) a digital processor;

b) two or more model predictive controllers each having an associated submodel of a linear model having two or more submodels for said process therein; and

c) a simulation environment routine having said nonlinear model therein, said simulation environment routine executed by said digital processor for:

(i) converting at least one submodel of a nonlinear model having two or more submodels to said associated linear submodel;

(ii) using said nonlinear model in a real time optimizer to compute targets for all of said two or more model predictive controllers, a predetermined subset of said computed targets associated with a respective one of said two or more model predictive controllers;

(iii) passing each of said predetermined subsets of said computed targets associated with a respective one of said two or more model predictive controllers to said associated one of said two or more controllers; and

(iv) passing said linear submodel to said associated one of said two or more controllers.

Claim 34 (original): The apparatus of Claim 33 further comprising a regulatory control system for controlling said

process according to said predetermined subsets of said computed targets passed to said associated one of said two or more controllers.

Claim 35 (canceled)

Claim 36 (new): A method for controlling a process comprising:

a) receiving plant measurement variables from a regulatory control system;

b) applying said plant measurement variables to update one or more variables of a nonlinear model;

c) linearizing said updated nonlinear model when a change in said one or more of said model variables has exceeded an associated predetermined threshold; and

d) passing a MPC format model converted from said linearized model to a model predictive controller.

Claim 37 (new): A method for controlling a process comprising:

a) receiving plant measurement variables from a regulatory control system;

b) applying said plant measurement variables to update one or more variables of a nonlinear model;

c) linearizing said updated nonlinear model; and

d) passing a MPC format model converted from said linearized model to a model predictive controller,

said updated nonlinear model linearized when one or more model prediction errors in said MPC format model currently operational in said model predictive controller has exceeded an associated predetermined threshold.

Claim 38 (new): A method for controlling a process comprising:

a) applying simulation stimuli to update one or more variables of a nonlinear model comprising:

(iv) pretreating said simulation stimuli;

(v) reconciling said pretreated simulation stimuli; and

(vi) using said reconciled and pretreated simulation stimuli to update said nonlinear model;

b) linearizing said updated nonlinear model when a change in said one or more of said model variables has exceeded an associated predetermined threshold;

c) converting said linearized model to a full order state space model;

d) creating from said full order state space model a state space model having fewer states than said full order state space model;

e) converting said fewer states state space model to a MPC format model; and

f) evaluating the performance of said MPC format model with the tuning for a presently existing model of said process in a model predictive controller versus the performance of said presently existing model with said tuning and either:

passing said MPC format model with said presently existing model tuning to a model predictive controller when said performance evaluation of said MPC format model exceeds a first predetermined limit; or

computing new tuning for said MPC format model when said performance evaluation falls below said first predetermined limit and repeating said evaluations; or

returning said MPC format model to said creating a MPC format model having fewer states than said full order state space model to change the number of states in said MPC format model when said performance of said MPC format model falls below said first predetermined limit.

Claim 39 (new): A method for controlling a process comprising:

a) applying simulation stimuli to update one or more variables of a nonlinear model comprising:

(iv) pretreating said simulation stimuli;

(v) reconciling said pretreated simulation stimuli; and

(vi) using said reconciled and pretreated simulation stimuli to update said nonlinear model;

b) linearizing said updated nonlinear model when a change in said one or more model prediction errors in a MPC format model currently operational in a model predictive controller has exceeded an associated predetermined threshold;

c) converting said linearized model to a full order state space model;

d) creating from said full order state space model a state space model having fewer states than said full order state space model;

e) converting said fewer states state space model to a MPC format model; and

f) evaluating the performance of said MPC format model with the tuning for a presently existing model of said process in a model predictive controller versus the performance of said presently existing model with said tuning and either:

passing said MPC format model with said presently existing model tuning to a model predictive controller when said performance evaluation of said MPC format model exceeds a first predetermined limit; or

computing new tuning for said MPC format model when said performance evaluation falls below said first predetermined limit and repeating said evaluations; or

returning said MPC format model to said creating a MPC format model having fewer states than said full order state space model to change the number of states in said MPC format model when said performance of said MPC format model falls below said first predetermined limit.

Claim 40 (new): A method for controlling a process

comprising:

a) applying simulation stimuli to update one or more variables of a nonlinear model comprising:

(iv) pretreating said simulation stimuli;

(v) reconciling said pretreated simulation stimuli; and

(vi) using said reconciled and pretreated simulation stimuli to update said nonlinear model;

b) linearizing said updated nonlinear model when a change in said one or more of said model variables has exceeded an associated predetermined threshold;

c) converting said linearized model to a MPC format model; and

d) passing said MPC format model to a model predictive controller comprising:

evaluating the performance of said MPC format model with the tuning for a presently existing model of said process in a model predictive controller versus the performance of said presently existing model with said tuning and either:

passing said MPC format model with said presently existing model tuning to a model predictive controller when said performance evaluation of said MPC format model exceeds a first predetermined limit; or

computing new tuning for said MPC format model when said performance evaluation falls below said first predetermined limit and repeating said evaluations.

Claim 41 (new): A method for controlling a process comprising:

a) applying simulation stimuli to update one or more variables of a nonlinear model comprising:

(iv) pretreating said simulation stimuli;

(v) reconciling said pretreated simulation stimuli; and

(vi) using said reconciled and pretreated simulation stimuli to update said nonlinear model;

b) linearizing said updated nonlinear model when a change in said one or more model prediction errors in a MPC format model currently operational in a model predictive controller has exceeded an associated predetermined threshold;

c) converting said linearized model to a MPC format model; and

d) passing said MPC format model converted from said linearized model to a model predictive controller comprising:

evaluating the performance of said MPC format model with the tuning for a presently existing model of said process in said model predictive controller versus the performance of said presently existing model with said tuning and either:

passing said MPC format model with said presently existing model tuning to a model predictive controller when said performance evaluation of said MPC format model exceeds a first predetermined limit; or

computing new tuning for said MPC format submodel when said performance evaluation falls below said first predetermined limit and repeating said evaluations.